THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:

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COLLECTION OF TAP WATER SAMPLES

EG&G ROCKY FLATS PLANT	**Manual:**	**5-21000-OPS**
EMD MANUAL OPERATION SOP	**Procedure No.:**	**SW.7, Rev. 2**
	Page:	**1 of 12**
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Category 2	**Organization:**	**Environmental Management**

TITLE:
COLLECTION OF TAP
WATER SAMPLES

Approved By:

(Name of Approver) (Date)

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2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used for the Rocky Flats Environmental Management (EM) Program and is applicable to the collection of water samples from all taps and valves that provide for the free flow of water when the valve is in the open position. This SOP also describes personnel responsibilities and qualifications, sample collection and preservation procedures, quality assurance/quality control (QA/QC), and documentation requirements that will be used for field data collection activities in order to attain acceptable standards of accuracy, comparability, representativeness, and completeness.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

All personnel performing these procedures are required to have the appropriate health and safety training as specified in the site-specific Health and Safety Plan. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training regarding these procedures, if necessary.

Personnel performing tap water sampling activities will be geologists, hydrologists, engineers, or field technicians with an appropriate amount of applicable field experience or on-the-job training under supervision of another qualified person.

4.0 REFERENCES

4.1 SOURCE REFERENCES

The following is a list of references reviewed prior to the writing of this procedure:

A Compendium of Superfund Field Operations Methods. EPA/540/p-87/001. U.S. Environmental Protection Agency. December 1987.

DOE 1987: The Environmental Survey Manual. DOE/EH-0053, Volumes 1-4. U.S. Department of Energy. August 1987.

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA/540/g-89/004, U.S. Environmental Protection Agency. Interim Final. October 1988.

RCRA Facility Investigation Guidance. Environmental Protection Agency. Interim Final. May 1989.

Microbiological Methods for Monitoring the Environment, Water and Wastes. Environmental Monitoring and Support Laboratory, Cincinnati. EPA-600/8-78-017-December, 1978.

Standard Methods for the Examination of Water and Waste Water. APHA-AWWA-WPOF-17th Edition, 1989.

NPDES/FFCA Operations Sampling Plan. Environmental Management Surface Water Division, Rocky Flats. (In progress).

4.2 INTERNAL REFERENCES

Related SOPs cross-referenced by this SOP are as follows:

- SOP FO.3, General Equipment Decontamination
- SOP FO.7, Handling of Decontamination Water and Wash Water
- SOP FO.11, Field Communications
- SOP FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples
- SOP FO.14, Field Data Management
- SOP GW.5, Measurement for Groundwater Field Parameters
- SOP SW.2, Field Measurement of Surface Water Field Parameters

5.0 METHODS

Collection of representative tap water samples through grab sampling of taps, valves, or faucets requires that a reliable SOP be written and implemented. A number of factors may need consideration. For instance, the presence or absence of a holding tank will have an effect on values and stabilization times for parameters such as volatile constituents, pH, and temperature. The following procedure will be utilized to collect samples from taps, valves, or faucets:

- Gloves will be worn by the sampler at all times during the sample collection. Sterile gloves will be worn for collection of bacteriological samples. To avoid contaminating the sample, the inside of the cap and the sample bottle must not be touched with the fingers nor allowed to touch the tap or ground. In order to avoid dislodging particles in the faucet, it is important that the tap's stream flow not be adjusted during sampling.

- The sample is to be collected from the first accessible point at the sampling site. All sampling must be done prior to any filtration or other treatment. If the tap contains an aerator or strainer, it should be removed. Purging is not required at off-site community taps.

- Remove all hoses or any other attachments from the tap to be sampled. If the tap is located in an area where the discharge cannot be allowed to flow onto the ground, the hose may remain attached to the tap throughout the 10-minute purge or throughout the 1-minute purge when sampling carbon treatment systems or 30 second purge when sampling ion exchange and/or ultraviolet/hydrogen peroxide treatment system; however, before sampling, the hose must be removed and the tap purged for an additional 2 minutes before sampling. Leaving the hose attached during purging should be avoided if possible.

- If bacteriological samples are to be collected, the tap will be heated with a flame from a lighter or burner for 15 seconds before beginning purging. Use NaOCl solution (100 mg/L) or household bleach diluted 2 mls/L and place end of faucet in solution or squirt solution in and on faucet from a squeeze bottle.

- Purge the line by adjusting the cold water side of the tap to provide a smooth-flowing water stream at a moderate pressure that prevents splashing, and record the time that the purging was initiated on the tap water sampling log sheet. Ideally, if volatile organic compounds (VOC) samples are to be collected, the flow rate should not exceed 100 ml/min. However, the primary consideration will be to provide a smooth flowing water stream at a moderate pressure that will minimize aeration of the sample.

- Purging of non-mixing faucets: Remove screen if present. Run cold water line for half of purging time. Shut off water. Disinfect faucet. Turn on cold water for remaining purging time.

- Purging of mixing faucet: Remove screen. Run hot water line for half of purging time. Shut off water. Disinfect faucet. Turn on cold water line and run water for remaining purging time.

- Purging drinking well water samples: Purge for a minimum of five minutes.

- Estimate the rate of purging by measuring the volume collected in a 250 ml to 1-liter graduated cylinder depending on flow rate, over a 15- to 30-second period. The collection period will be timed with a stopwatch. The volume collected in liters will be divided by the time in seconds and then multiplied by 60 seconds per minute to yield the evacuation rate in liters per minute. Record this information on the tap water sampling log sheet.

- Allow the water to purge for at least 10 minutes, or if sampling carbon treatment systems, allow the water to purge for at least 1 minute (if sampling ion exchange system purge for at least 30 seconds) before collecting the first sample to ensure that the sample will be free of any rust or residue that may be in the tap. If not free of rust and residue after 10 minutes, continue to purge until the water is visibly clear or until field parameters have stabilized. Record the completion time of purging, the total duration of the purging event and calculate and record the estimated volume of water purged by following the equation given on the tap water collection log sheet.

- When sampling water from a groundwater well, measure the pH, temperature, and conductivity of the water a minimum of three times during purging to determine if measured parameters are stable at the time of sampling by following SOP SW.2, Field Measurement of Surface Water Field Parameters. Record these values as well as the time the sample was taken for each set of readings on the tap water collection log sheet. Measurements will be a minimum of 2 minutes apart. Field parameters will be considered stable when two consecutive readings for pH, conductivity, and temperature taken at least two minutes apart, differ by less than 10 percent.

- Record any unusual observations about the water during purging, such as color or odor; record the time that purging is completed, and record the length of the purge cycle.

- During purging, check for the presence of total residual chlorine by following procedures in SOP SW.2, Field Measurement of Surface Water Field Parameters. TFC will be checked after purging and collection of bacteria sample have been performed.

- Collect the sample at the same flow rate as the purge flow rate by removing the cap of the specified container and placing the container under the tap until it is full. Hold the bottle in one hand and the cap in the other, right side up (threads down), while collecting the sample. If the cap liner or septum has a tendency to fall out of the cap, the cap and liner/septum should be placed on a sheet of plastic with the thread side down.

- Collect the samples in the order specified in Table SW.7-1. Sampling at each site will be specific to the needs and requirements for that site as determined by the

site supervisor. The full set of parameters listed in Table SW.7-1 will not always be collected at each site, and additional parameters may be required in some instances.

- After collecting the sample, replace the cap, apply a tamper-proof seal (for bacteria samples going to 123 lab), place the bottle in a plastic bag (unless samples are going to on-site lab), and store in a cooler at 4 °C.

- Turn off the water supply and replace any aerators, strainers, hoses, or other attachments that were removed.

- Complete all chain-of-custody forms and documentation at the time the samples are collected.

TABLE SW.7-1

SAMPLE PARAMETERS AND ORDER OF FIELD COLLECTION

Total coliform
Fecal coliform
Heterotrophic plate count
TCL VOCs
TCL BNAs
Pesticides/PCBs
TAL Metals (dissolved)[a]
Nitrate/Nitrite as N
Major Ions[a], TSS, TDS
Cyanide
Radionuclides - Total[a]
Tritium

[a] See Table SW.7-2 for individual analytes.

Sample containers will be precleaned or purchased precleaned before use in the field. All containers, preservatives, and holding times will conform to EPA requirements as listed in Table SW.7-2. Additional information on containers, preservatives, and holding times may be found in SOP FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples.

Subsequent to sampling, all samples will be placed in sample coolers. The temperature inside the cooler will be cooled to 4°C. This temperature will be maintained by adding blue ice sealed in plastic bags.

6.0 DECONTAMINATION

Equipment will be decontaminated after use at each site. Procedures for decontamination are set forth in SOP FO.3, General Equipment Decontamination.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

QA samples for tap water sampling fall into one category:

- Duplicate

SOP FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples describes the general handling of samples. Applicable project plans specify QA sample frequencies.

TABLE SW.7-2

CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Parameter	Container	Preservative	Holding Time (Days)
TCL VOC	2 glass 40-ml vial w/Teflon®-lined	Approx. 10 mg $Na_2S_2O_3$[a], HCL to pH <2.0	7 days
	Silicon Rubber Septum	4°C	14 days
TCL BNA	Glass-Amber/2 x 1 L	4°C $Na_2S_2O_3$[a]	7 days to extraction 40 days after extraction
Pesticides/PCB	Glass-Amber/2 x 1 L	4°C	7 days to extraction 40 days after extraction
TAL Metals (dissolved)[b]	Polyethylene/1 x 1 L	Filter[c]; HNO_3 to pH<2;4°C	180[d]
TAL Metals (total)	Polyethylene/1 x 1 L	HNO_3 to pH<2;4°C	180[d]
Total Coliform	Sterile polyethylene or glass/1 x 125 ml	0.1 ml of 10% $Na_2S_2O_3$;4C lab bottles are pre-preserved	6 hours
Fecal Coliform	Sterile polyethylene or glass/1 x 125 ml	0.1 ml of 10% $Na_2S_2O_3$;4C lab bottles are pre-preserved	6 hours
Heterotrophic Plate Count	Sterile polyethylene or glass/1 x 125 ml	0.1 ml of 10% of $Na_2S_2O_3$;4C lab bottles are pre-preserved	6 hours
Cyanide	Polyethylene/1 x 1 L	NaOH to pH>12;4°C; 0.6 grams ascorbic acid[a]	14 days
Major Ions[e]	Polyethylene/1 x 1 L	4°C	See footnote (f)

TABLE SW.7-2

CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

(Continued)

Parameter	Container	Preservative	Holding Time (Days)
Nitrate + Nitrate as N	Polyethylene/100 ml	H_2SO_4 to pH<2;4°C	28 days
TSS and TDS[g]		4°C	7 days
Radionuclides[h]			
Total	Polyethylene/3 x 3.79 L	HNO_3 to pH<2	180 days
Tritium	Glass/100 ml	None Required	180 days
Radiation Screen	Plastic/250 ml	None Required	Not Applicable (i)

[a] Should only be added if measurable (greater than 0.2 ppm) residual chloride is present.

[b] TAL metals are Al, Sb, As, Ba, Be, Cd, Ca, Cr (total), Co, Cu, Fe, Pb, Mg, Hg, Ni, K, Se, Ag, Na, Tl, V, and Zn. Additional parameters to be analyzed are Cs, Li, Mo, Sn, and Sr.

[c] A 0.45-micron filtering apparatus will be used.

[d] Holding time for mercury is 28 days.

[e] The requested major ions are CO_3, HCO_3, F, Cl, SO_4, and PO_4.

[f] Holding times for the requested major ions are as follows: CO_3 and HCO_3, 14 days; Cl, F, SO_4, 28 days; and PO_4, 48 hours.

[g] TDS (Total Dissolved Solids) and TSS (Total Suspended Solids) will be collected in the same sample container as the Major Ion analysis.

[h] Radionuclides are gross alpha and beta; PU-239; Pu-240; Am-241; U-233, 234, 235, and 238; Sr-90; Cs-137; Ra-226; and Ra-228.

[i] Radiation screening samples are analyzed by an on-site EG&G lab and are typically analyzed within 24 hours of collection.

Sample collection procedures will be the same as those described in Section 5.0 of this SOP for duplicate, matrix spike, and duplicate matrix spike samples. These samples are intended to be as close to exact replicates of the original samples as possible. They are obtained immediately adjacent to the planned samples they are intended to duplicate.

Field blank samples are containers filled with clean water that are handled and transported the same as the other samples to check for potential cross-contamination resulting from field handling and transportation procedures.

8.0 DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting field observations and data on the tap water sampling log sheet (Form SW.7A and SW.7B) . Observations and data will be recorded with black waterproof ink. Field logbooks and NPDES/FFCA daily log sheets for bacteriological sampling will be utilized to summarize the daily field activities and to document project information not required by the field forms. Initials of the individual entering the information onto the form should be written next to each entry as it is made.

ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT PROGRAM
TAP WATER SAMPLING LOG SHEET

Site ID Number: _____ Date: ____/____/____

Location: _____

WATER USE

[ ] SINGLE FAMILY [ ] MULTIPLE FAMILY [ ] LIVESTOCK

[ ] COMMERCIAL [ ] OTHER (SPECIFY) _____

_____

WATER SOURCE

[ ] PUBLIC WATER SUPPLY [ ] GROUNDWATER WELL

[ ] OTHER (SPECIFY) _____

_____

PURGING

START TIME: _____ COMPLETION TIME: _____

DURATION OF PURGE: _____

PURGE RATE: _____ (VOLUME-L) X _____ (TIME-SECONDS ÷ 60) = ___ LITERS/MINUTE

ESTIMATED VOLUME PURGED: _____

PURGE RATE: _____ (L/MIN) X DURATION _____ (MIN) = _____ LITERS

ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT PROGRAM
TAP WATER SAMPLING LOG SHEET

FIELD MEASUREMENTS DURING PURGING

Volume Purged (liters)	Temp (°C)	Specific Conductance (μS/cm)	pH	Time	Water Description

OBSERVATIONS

ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT PROGRAM
GROUND/SURFACE WATER TREATMENT SYSTEM SAMPLING LOG SHEET

Operable Unit Number		Date	
Treatment System		Time	
Sample Location			
Sample Number		Purge Time	

FIELD MEASUREMENTS

Time	Temp (Celsius)	pH	Conductance (microS/cm)	Water Description

OBSERVATIONS